Answer on Question #43502, Math, Statistics and Probability

The distribution of the width of a standard piece of computer paper is normal with an expectation of 8.5 inches and the standard deviation of 0.2 inch.
a) Find the probability that the width of any given piece of computer paper is between 8.40 and 8.55.
b) Find the probability that the width of any given piece of computer paper is less than 8.35.
c) Find the probability that the width of any given piece of computer paper is greater than 8.6.

Solution:
The mean equals $\mu = 8.5$ and the standard deviation equals $\sigma = 0.2$. Let random variable X has the distribution of the width of a standard piece of computer paper. If $Z = \frac{X-\mu}{\sigma} = \frac{X-8.5}{0.2}$, then Z has normal distribution with mean $\mu = 0$ and the standard deviation equals $\sigma = 1$.

a)
$$P(8.40 < X < 8.55) = P(-0.5 < X < 0.25) =$$
$$= P(X < 0.25) - P(X < -0.5) \approx 0.595 - 0.401 \approx 0.194.$$

b)
$$P(X < 8.35) = P(Z < -0.75) \approx 0.227.$$

c)
$$P(X > 8.6) = P(Z > 8.6) = P(Z > 0.5) = P(Z < -0.5) \approx 0.309.$$

Answer: a) 0.194. b) 0.227. c) 0.309.